Status of the Ocean-Colour Algorithm working Group

ZPL on behalf the OCAG

Outline:

1. The synthesized dataset
2. Preliminary results of some inversion algorithms
3. Next
1. Some characteristics of the synthesized dataset

a. It includes Case-1 and Non-Case-1
b. Closely follow natural variations
c. Wide dynamic range
d. AOPs are simulated using Hydrolight
1. Some characteristics of the synthesized IOPs

Generally,

\[ a(\lambda) = a_w(\lambda) + a_{ph}(\lambda) + a_{dm}(\lambda) + a_g(\lambda) \]
\[ bb(\lambda) = bb_w(\lambda) + bb_{ph}(\lambda) + bb_{dm}(\lambda) \]

**Four-components** to model \( a \).
**Three-components** to model \( bb \).
**Independent phase functions** for water, phytoplankton, and detritus/mineral scatterings.

All components vary independently, but in a range selected by the group.

So, for a low \( a_{ph} \), no extremely large \( a_g \) or \( a_{dm} \). Or, for a large \( a_{ph} \), no extremely low \( a_g \) or \( a_{dm} \).
1. Characteristics continue:

\[ a_{ph}(\lambda) = a_{ph}(440) a^+_{ph}(\lambda) \]

\[ a_{dm}(\lambda) = a_{dm}(440) \exp(-S_{dm}(\lambda - 440)) \]

\[ a_{g}(\lambda) = a_{g}(440) \exp(-S_{g}(\lambda - 440)) \]

variables
1. Characteristics continue: $a_{ph}(440)$
Examples of $\alpha_{ph}^{+}(\lambda)$

Randomly from measurements of Bricaud and Carder.
1. Characteristics continue:

\[ a_{dm}(440) \] and \( S_{dm} \)
1. Characteristics continue:

\[ a_g(440) \text{ and } S_g \]
1. Characteristics continue:
1. Characteristics continue:

- \( bb_p(550) \) (\( m^{-1} \))
- \([C] \) (ug/l)

(Morel Case-1 average)
Examples of simulated $R_{rs}(\lambda)$

- $[C] = 0.03$
- $[C] = 0.1$
- $[C] = 0.3$
- $[C] = 1.0$
2. Preliminary results of some inversion algorithms

- A. Empirical algorithm
- B. Carder model-based algorithm
- C. Hoge/Lyon model-based algorithm
- D. Loisel model-based algorithm
- E. Lee model-based algorithm
- F. Maritorena model-based algorithm
- G. Lee model-based algorithm (optimization)
- H. Boss model-based algorithm
- I. Doerffer Neural-Net algorithm

(Not a fair comparison yet!)
A. Empirical algorithm [SeaWiFS & Morel/Maritorena 2001]

**Approach:** OC4v4 $\rightarrow$ [C] $\rightarrow$ K $\rightarrow$ a

**Input:** Rrs(440, 490, 510, 555)

Symbol: inversion
B. Carder [1999] model-based algorithm

**Approach:** Rrs → a&b_b

**Input:** Rrs(410, 440, 550)

![Graphs showing derived vs. true values for bbp, aeg, adg, and bg with 1:1 symbol and inversion note.](image-url)
C. Hoge/Lyon [1996] model-based algorithm

**Approach:** $Rrs \rightarrow a \& b_b \{\text{LMI}\}$

**Input:** $Rrs(410, 500, 590)$

![Graphs showing derived vs. true values for $b_{bp}(500)$ and $a_{dg}(410)$](image1)

Symbol: inversion

![Graphs showing derived vs. true values for $a_{410}$ and $a_{500}$](image2)
D. Loisel [2001] model-based algorithm

**Approach:** $Rrs \rightarrow K_d \rightarrow a & b_b$

**Input:** $Rrs(410, 440, 490, 555)$

![Graphs showing model results](image-url)
E. Lee [2002] model-based algorithm

**Approach:** $\text{Rrs} \rightarrow a \& b_b \{\text{QAA}\}$

**Input:** $\text{Rrs}(410, 440, 490, 510, 555)$

![Graphs showing derived values vs. true values for various parameters](image-url)
F. Maritorena [2002] model-based algorithm

**Approach:** $\text{Rrs} \rightarrow a&b_b \{\text{optimization}\}$

**Input:** $\text{Rrs}(410, 440, 490, 510, 555)$

**Symbol:** inversion
G. Lee [1999] model-based algorithm

**Approach:** \( \text{Rrs} \rightarrow a \& b_b \{\text{optimization}\} \)

**Input:** \( \text{Rrs}(410, 440, 490, 510, 555) \)
H. Boss [2004] model-based algorithm

Approach: ?

Input: $Rrs(410:10:650)$
I. Doerffer Neural-Net algorithm
3. Next:

a. Introduce “noises” into the current dataset, and run the algorithms again.
b. Meeting in Feb. to discuss what/how to compare results.
c. A workshop to present/discuss inversion results.
d. Prepare reports regarding algorithm performances.